PRACTICAL WIRELESS

Shoot!

SHOOT

ADD-ON UNIT FOR THE PW TELE-GAMES

and

Handy-Mini POWER SUPPLY

ATOMIC TIME Receiver

Morse Tutor

VOLTS

4   6

2   8

0   10

   12

OUTPUT

ON

CURRENT

mA

50mA

500mA LIMIT

audio   read

&

visual   key

vol.   tone   speed   start

pw TELE~ {TENNIS FOOTBALL SQUASH PELOTA

plus:~ ON-SCREEN SCORING & SOUND EFFECTS

THE General Instrument AY-3-8500 IC has two positions on the games switch that provide a square target for use in shooting games. In the first position the target bounces round the screen in an invisible box. In the second position the target crosses the screen from left to right. When the reset button is pressed the screen is blanked except for the target. After 15 shots the score appears to indicate the number of hits out of 15.

SHOOT is an add-on unit which allows an aiming mark to be placed on the screen and moved around by joystick control to chase the target. If the firing button is pressed when the aiming mark is on target a point is scored. A variable timer allows the aiming mark to be placed on the screen for preset times.

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Circuit description

The circuit of the unit is shown in Fig. 1. The unit obtains its supplies from the main 8500 PCB. The sync from the 8500 is fed to pin 5 of IC1b and to Tr1. IC1b fires on each line sync and controls the horizontal position of the aiming mark, its range being approximately 15 to 55μs. The components C5, R5, D2 determine the width of the mark, the values on the circuit giving a width of 0.5μs. Tr1 is used to separate the frame sync from the line sync and provides a trigger pulse each frame to pin 12 of IC1a. IC1a controls the vertical portion of the aiming mark and is variable over the range approximately 5 to 18μs. Components C3, R4, D1 determine the height of the mark; the values shown give a height of 3 lines. S1 is the fire switch, debounced by IC3a and b. IC3 output from pin 10 is fed to the shot input of the AY-3-8500 incrementing the shot counter each time the trigger is pressed. C6, R8, D3 determine the width of the fire window. C6 can be increased to make the window wider which makes the game easier.
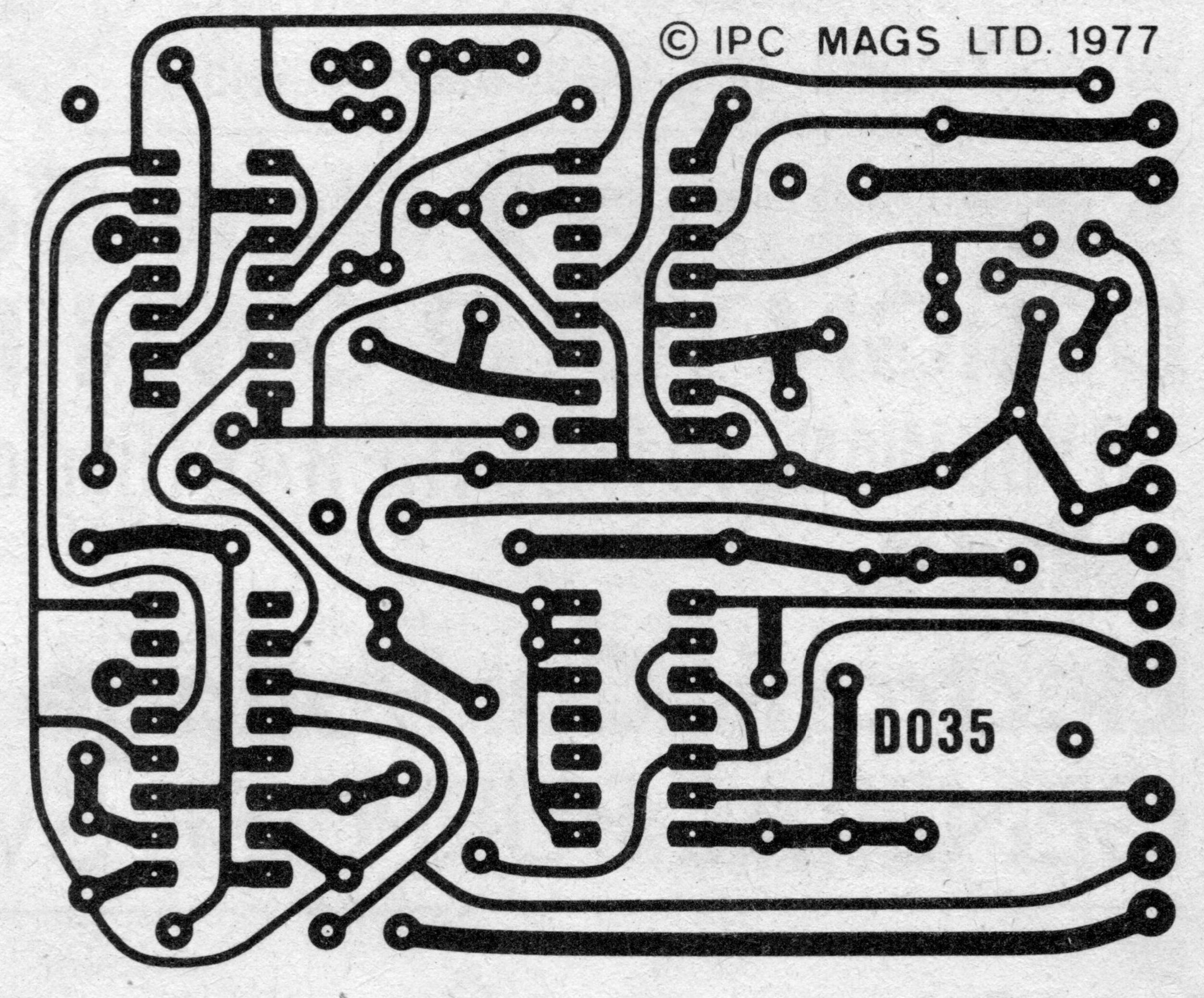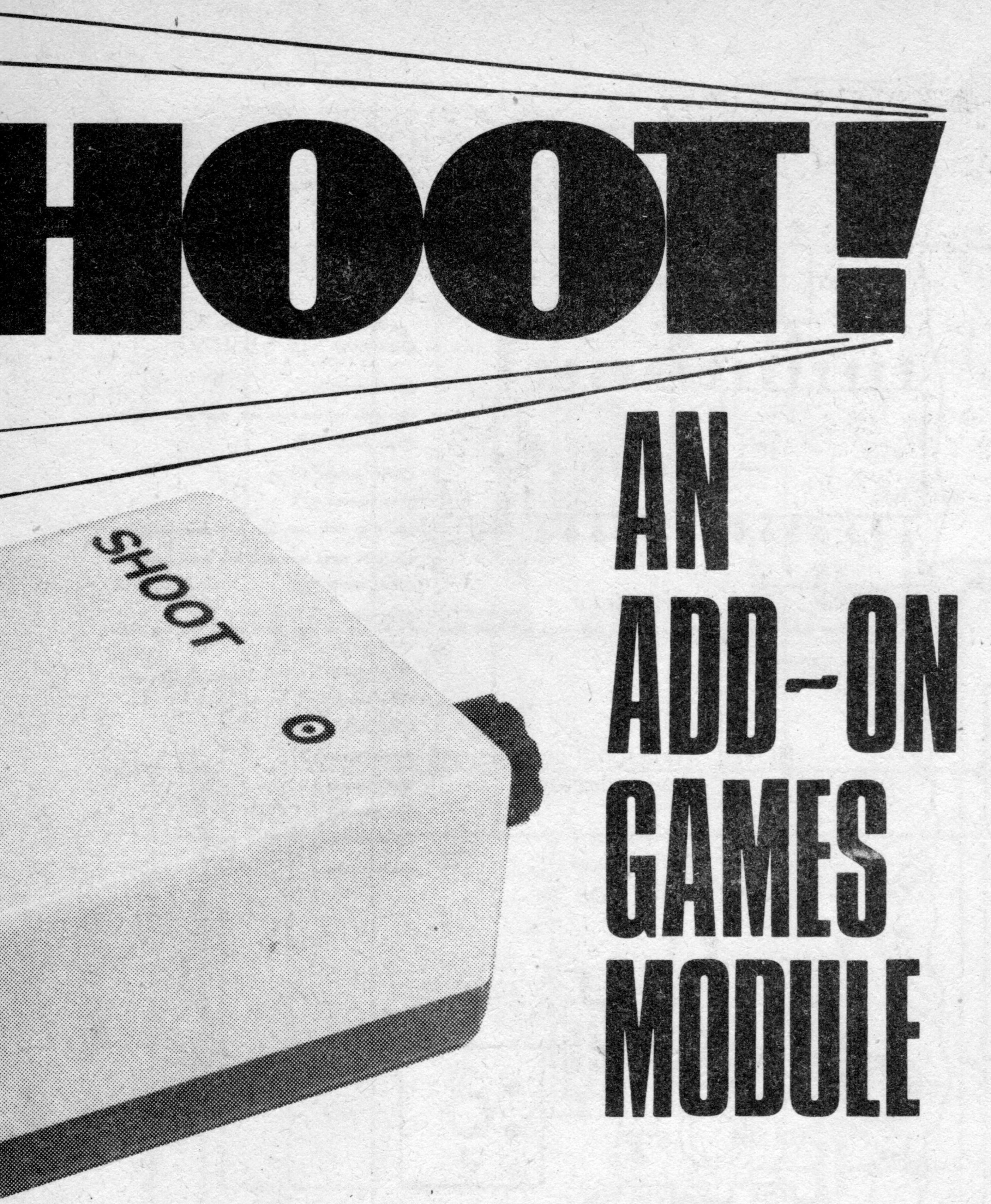
Gating

IC1a and b gate IC4a together with the output from IC2a. When S2 is pressed IC2a fires for a period determined by VR3 opening gate IC4a. The output of IC4a is inverted by IC4b, used to produce the spot on the screen, and also gates IC4c. The ball output from the AY-3-8500 and the fire window from C6 are also fed to IC4c. When a hit is detected by this gate, IC2b fires and outputs a pulse to the 8500 hit input. This increments the hit counter, outputs a tone and blanks the target for the duration of the hit pulse.

There are therefore seven connections between the 8500 main PCB and SHOOT: 0V, +8V, SYNC, BALL OUTPUT from the main PCB and shot, hit and AIMING MARK from SHOOT.

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SHOOT!

AN ADD-ON GAMES MODULE
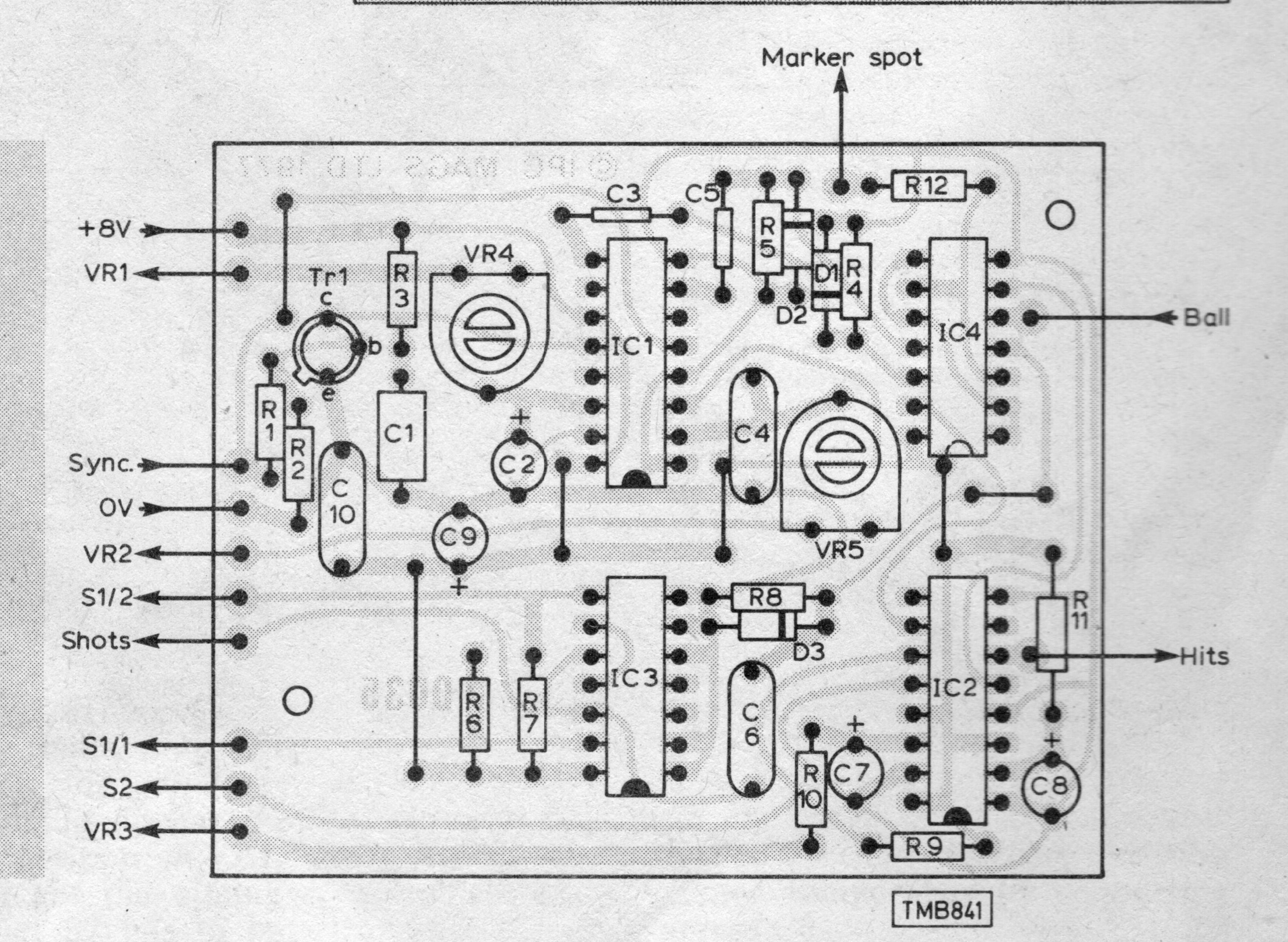
Construction

Actual mechanical construction will depend on the size of the joystick used; a typical layout is shown in Fig. 5. As standard joysticks used for radio control may have 5kΩ pots fitted, ensure that the type obtained can be modified to take a 25kΩ and a 50kΩ pot. If one is obtained with a tubular operating arm, S1 may be mounted in a piece of dowel and fitted on top of the operating arm.

Fig. 2 (left): PCB copper side shown actual size. The board is secured to the base of the plastic housing by two 6BA bolts inserted through the drillings indicated on the board. Circuit diagram (Fig. 1) is shown on page 283.

Fig. 3 (right): PCB component layout. DIL sockets should be used for all ICs unless the usual CMOS soldering procedures are followed. Devices should be left in the conductive foil or foam until ready for insertion; pins 2 and 14 of the MC14528 are especially susceptible to static damage since these do not have the normal input protection diodes.

When the mechanical parts have been mounted in a suitable box, begin assembly of the PCB. Fit the wire links as shown by the single lines on Fig. 3 and fit the other components. As CMOS devices are used in the system it is advisable to fit IC sockets and leave insertion of the ICs until construction is finished. If you do not use sockets then use an iron with an earthed tip for soldering. When the PCB is complete fit it into the box. Fig. 3 also shows the connections to the board.

Connection

A seven-pin plug should be fitted to the cable to join the unit to the TV games unit with a matching socket in the latter's box. The connection points on the 8500 PCB are shown in Fig. 4. The sync output is taken from pin 16 on the 8500 IC and the marker spot lead connects to the end of R9. The +8V output

NOTE: Additional connections shown dotted.

Fig. 4: Interconnection diagram for use with PCB featured in the June 1977 Telegames unit. Although the prototype SHOOT module was connected to the main unit by flying leads, readers are recommended to fit 7-pin DIN plugs or other multiway connectors to both master and slave games unit.
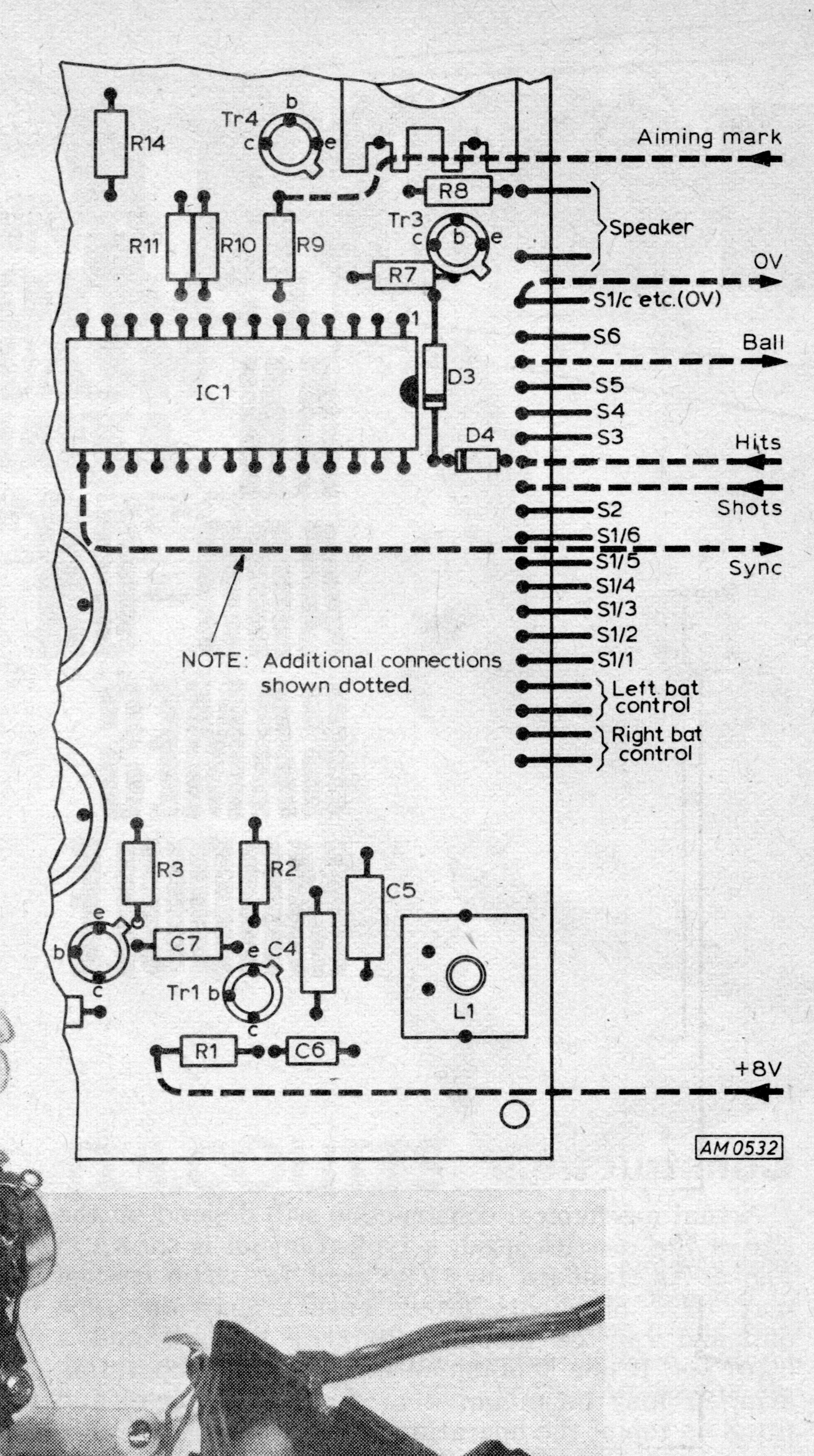
Fig. 5: Photo of the prototype with cover removed and shown the wrong way round. The pan pot assembly fits towards the opposite end from the PCB and not as indicated in the picture! The pan pot assembly was originally intended for use with radio control apparatus; the actual potentiometers are standard components. The joystick assembly should be obtainable from radio control specialists.
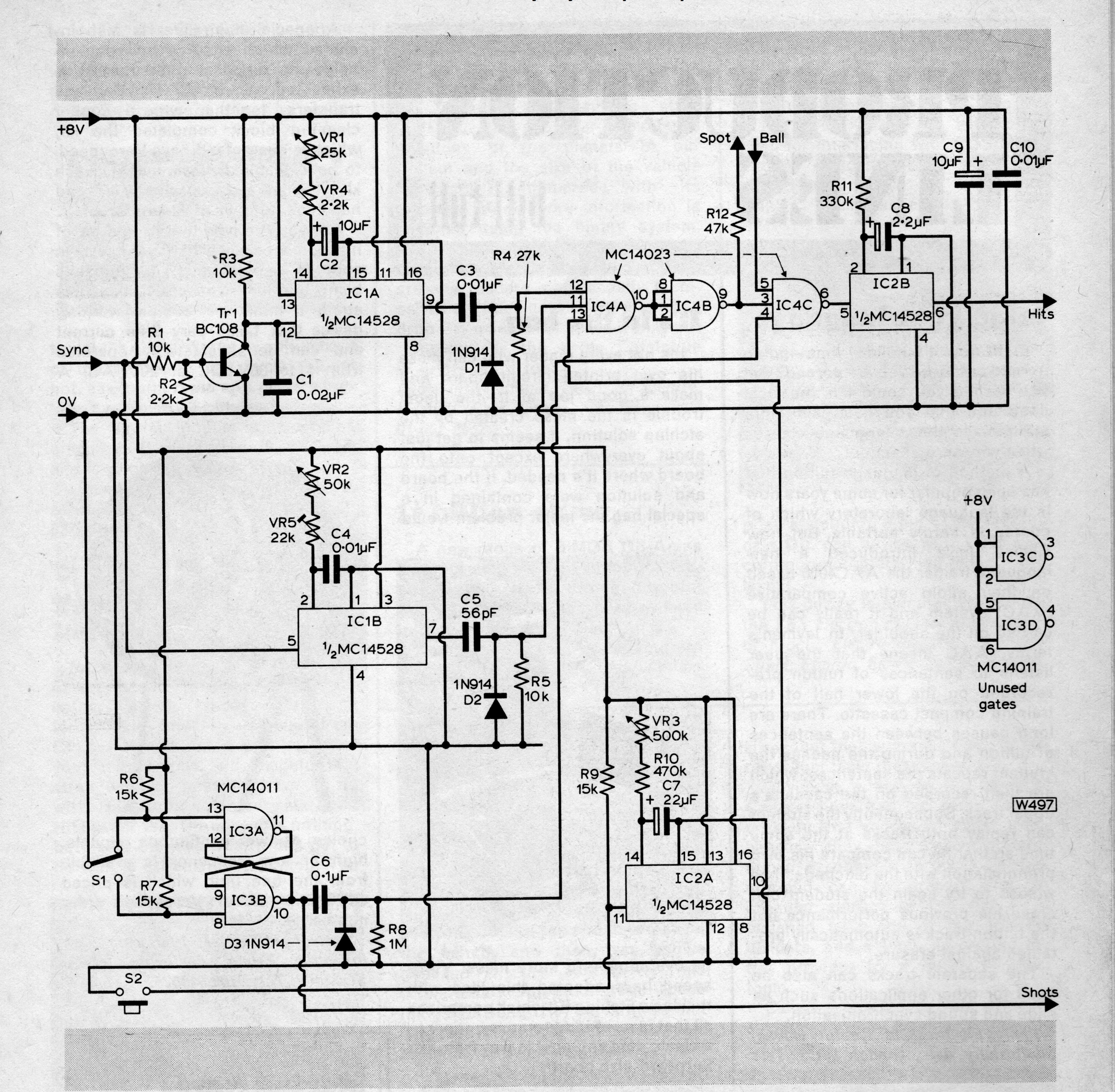
Fig. 1 : Circuit diagram. The text referring to this occurs on page 280. IC3c and d are unused gates, the inputs of which must be grounded or tied to the Vcc line. They must never be left floating. The power supply to the SHOOT module PCB is taken from the parent board in the Telegames unit. Note: VR4 should be shown as 22kΩ as in components list.

comes from the regulated supply. The other connections are on pins at the edge of the PCB.

Setting up

After checking the unit carefully for shorts, etc, connect the SHOOT adaptor to the main unit. Set VR3 to maximum resistance. Select rifle game R1 and auto mode when the target should appear on the screen. Push S2 and adjust the position of VR1, VR2 and the presets VR4, VR5 to get the aiming mark on the screen. Remember that S2 has to be pressed occasionally to keep the mark visible. When the mark has appeared on the screen adjust the pots and presets until the mark can be swept over most of the screen by means of the joystick. When this is satisfactory try out the fire button when a tone should be obtained each time the target is hit (N.B.—when moving the stick with the target moving fast it is easy to think you have a hit which hasn't registered when in fact a slight delay in pressing the fire button has caused you to miss). It is advisable to use slow speed for testing; further, the fire window can be widened temporarily by connecting another capacitor across C6.